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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/920,285	08/01/2001	Hans-Jurgen Mann	637.0008USQ	5678

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EXAMINER

NGUYEN, THONG Q

ART UNIT	PAPER NUMBER
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2872

DATE MAILED: 03/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/920,285	Applicant(s) MANN ET AL.	
	Examiner Thong Q Nguyen	Art Unit 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 December 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 and 28-47 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 3, 4, 11 and 28-47 is/are allowed.
- 6) ☒ Claim(s) 1-2, 5-10 and 12-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>12/10/2003</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The present Office action is made in response to the amendment filed on 12/10/2003 in which applicant has amended the specification and claims 1-3, 10-11 and 21; canceled claims 25-27; and added a new set of claims, i.e., 28-47, into the application. The pending claims 1-24 and 28-47 are examined in this Office action.

Priority

2. The objection to the specification made in previous office action is now withdrawn due to the filing of the new Oath and the request for filing correction.

The Office makes a correction to the priority status of the present application.

Specification

3. The lengthy specification which is amended by the amendment has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1-2, 5-10, 13-16, and 18-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shafer (U.S. Patent No. 5,686,728) in view of Takahashi (Japanese reference No. 2000-100694) (both of record).

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Shafer discloses a projection lithography system in the production of semiconductor chips. The system as described in columns 7-9 and shown in figure 2 comprises the following optical features: 1) the wavelengths used in the range of ultraviolet spectrum; 2) there are six mirrors M1-M6 whose shapes are convex, concave, convex, concave, convex and concave configuration wherein each mirror comprises an off-axis segment for reflecting light incident thereon and arranged in a manner which does not block light to other mirrors; 3) the numerical aperture is 0.45; 4) the exposure region is an annular shape having a radius of 26 mm and width of 1 mm; 5) an aperture stop located between the first and second mirrors; 6) the fourth mirror M4 is located between the second mirror M2 and the image plane (W); 7) the fourth mirror M4 is located between the second and third mirrors; 8) the fourth mirror is located between the first and second mirrors; 9) the ratio defined by the distance between the fourth and first mirror and the distance between the second and first mirror is a value in the range of (0.1;0.9) and the ratio defined by the third and fourth mirrors and the distance between the second and third mirror is a value in the range of (0.3;0.9); 10) an intermediate image is formed after the fourth mirror; 11) the first mirror has a zero base configuration and all of the mirrors have aspheric configuration; 12) the system is telecentric on the image side, and 13) the edge region encircling the off-axis segments of the mirrors is larger than 4 mm. Regard to the feature "objective" recited in the preamble of the claim 1, such a feature is not given a patentable weight because all of features recited after the term

"comprising" do not provide specific limitations for the term "objective" referred to in the preamble part of the claim. As a result, the system provided by Shafer meets all of the limitations recited except the feature relating to the relationship between the diameter of the mirrors and the numerical aperture. However, the use of an exposure system having six mirrors wherein the diameter of the mirrors and the numerical aperture of the system is small is disclosed in the art as can be seen in the system provided by Takahashi. In particular, Takahashi discloses an exposure projection system having a catadioptric system for lithographically manufacturing devices like semiconductor devices. The system as described in the embodiment 1, pages 2-10 and figure 1, comprises six mirrors M1-M6 wherein the effective diameters of the mirrors M1-M6 is 344 mm. Takahashi also discloses that the mirrors M1-M3 and M5-M6 are aspheric mirrors and the mirror M4 is nonspherical mirror. Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify the system provided by Shafer by using mirror whose effective diameter is small as suggested by Takahashi for the purpose of reducing the obscuration to the transmission of light in the system.

Regarding to the feature that the diameter of the mirror is smaller than 300 mm as recited in claim 2, such a feature would have been obvious to one skilled in the art. The support for that conclusion is found in the teaching provided by Takahashi when he discloses that the effective diameter of the mirror has a maximum of 344 mm. Thus, it would have been obvious to one skilled in the art

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to adjust the effective diameter of the mirror in the combined product for the purpose of satisfying a particular design.

6. Claims 12 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shafer in view of Takahashi as applied to claim 1 above, and further in view of Hudyma (U.S. Patent No. 6,033,079, of record).

The combined product provided by Shafer and Takahashi as described above does not disclose that the mirrors are arranged in a manner in which the light incident on each of the mirrors is smaller than 18 degrees as recited in present claim 12 and the first mirror has a concave configuration as recited in present claim 17.

Regarding to the arrangement of the mirrors so that the angle of light incident on each of the mirrors is smaller than 18 degrees and the first mirror has a concave configuration, it is noted that such features are clearly suggested to one skilled in the art as can be seen in the optical system having six mirrors provided by Hudyma. In particular, Hudyma discloses a projection lithography system in the production of semiconductor chips. The system as described in columns 6-9 and shown in figure 5 comprises the following optical features: 1) the wavelengths used in the range of ultraviolet spectrum; 2) there are six mirrors M1-M6 whose shapes are concave, concave, convex, concave, convex and concave configuration wherein each mirror comprises an off-axis segment for reflecting light incident thereon and arranged in a manner which does not block light to other mirrors; 3) the numerical aperture is larger than 0.25; 4) the exposure

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region is an annular shape having a radius of 30 mm and width of 2 mm; 5) an aperture stop located between the first and second mirrors; 6) an intermediate image is formed after the fourth mirror; 7) the system is telecentric on the image side, and 8) the angle of incidence of a chief ray on each mirror is in the range of 12-15 degrees. Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify the combined product provided by Shafer and Takahashi by arranging the mirrors so that the light incident on each mirror is smaller than 18 degrees and the use of first concave mirror as suggested by Hudyma for the purpose of reducing the obscuration to the transmission of light in the system.

Response to Arguments

7. The amendments to the claims and applicant's arguments filed on 12/10/2003 have been fully considered. The following conclusions are made in response to the amendments and applicant's arguments.

A) Regarding to the objections to the specification, the claims 6, 10-11 and 24-27, it is noted that the amendments to the specification, the amendments to claims 6, 10-11 and the cancellation of claims 24-27 are sufficient to overcome the objections.

B) Regarding to the rejections of claims 1, 6-7, 9-10, 14, 17-20, and 22-24 under 35 USC 102(a) over the art of Takahashi (Japanese reference No. 2000-100694), it is noted that the amendments to claim 1 are sufficient to overcome the rejection.

C) Regarding to the rejections of claims 1-2, 5-10, and 12-24 under 35 USC 103(a) over the combination of art provided by Shafer, Takahashi and Hudyma as set

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forth in the previous Office action, pages 7-11, the amendments to the claims and applicant's arguments have been fully considered but they are not persuasive for the following reasons.

Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

Applicant argued that the art of Takahashi does not disclose the relationship between the diameter of the off-axis segments of the mirrors and the numerical aperture as claimed. The Examiner respectfully disagrees with the applicant's opinions. While Takahashi does not clearly disclose the inequality that governs the diameter of the off-axis segment of the mirrors being smaller or equal to $1200 \text{ mm} * \text{NA}$ wherein NA is larger than 0.2; however, the dimension of each of the mirrors of the system provided by Takahashi are clearly satisfy the value of the feature claimed. Applicant is respectfully invited to review the art of Takahashi in which he discloses a system having six mirrors M1-M6 wherein the effective diameters of the mirrors M1-M6 is 344 mm. Applicant should further note that the values which yields form the product thereof " $1200 \text{ mm} * \text{NA}$ " where NA is larger than 0.2 can be 240 mm (where NA is 0.2) or 300 mm (where NA is 0.25) or 360 mm (where NA is 0.3) or 420 mm (where NA is 0.35) or 480 mm (where NA is 0.4) or ... Since the feature of the numerical aperture claimed in the present claim has an open range; therefore, the product has an open range. The value of each effective diameter of the mirror provided by Takahashi is clearly meets the value

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resulted from the equality disclosed in the present claim. Applicant should further note that a relationship between the two elements or two functions can be expressed by a numerous mathematical ways, and the expression thereof "1200 mm * NA" is just one way of expression without any specific reason.

Allowable Subject Matter

8. Claims 3-4, 11 and 28-47 are allowed over the cited art.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

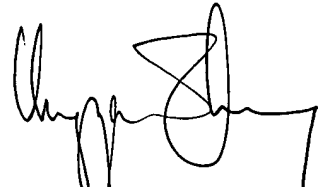
10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thong Q Nguyen whose telephone number is (571) 272-2316. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew A Dunn can be reached on (571) 272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Thong Q Nguyen
Primary Examiner
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